The documentation and process conversion measures necessary to comply with this revision shall be completed by 18 June 2014.

INCH-POUND

MIL-PRF-19500/689A
18 April 2014
SUPERSEDING
MIL-PRF-19500/689
28 February 2001

PERFORMANCE SPECIFICATION

* SEMICONDUCTOR DEVICE, FIELD EFFECT RADIATION HARDENED
TRANSISTOR, N-CHANNEL
SILICON TYPES 2N7512, 2N7513, AND 2N7514
JANTXVD, R AND JANSD, R

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19500.

1. SCOPE

* 1.1 Scope. This specification covers the performance requirements for a N-channel, enhancement-mode, MOSFET, radiation hardened, power transistor intended for use in high density power switching applications. Two levels of product assurance are provided for each device type as specified in MIL-PRF-19500.

1.2 Physical dimensions. See figure 1, TO-257.

1.3 Maximum ratings. T_A = +25°C, unless otherwise specified.

Type	P_T T_C = +25°C	V_{DS}	V_{DG}	V_{GS}	I_{D1} (1) T_C =+25°C	I_{D2} (1) T_C = +100°C	I_S (1)	I_{DM}	T_J and T_{STG}	V_{ISO} 70,000 ft. altitude
	W	V dc	V dc	V dc	A dc	A dc	A dc	A (pk)	°C	V dc
2N7512	56 (2)	100	100	±30	16	15	16	64	-55	N/A
2N7513	56 (2)	200	200	±30	14	9	14	40	to	N/A
2N7514	50 (3)	250	250	±30	11	7	11	32	+150	250

(1) $I_D = ((T_{jmax} - T_C)/((R_{\theta JC})X (r_{DS(on)} \text{ at } T_{jmax})))^{1/2}$.
(2) Derate linearly 0.45 W/°C for T_C > +25°C; $P_T = (T_{jmax} - T_C)/R_{\theta JC}$.
(3) Derate linearly 0.40 W/°C for T_C > +25°C; $P_T = (T_{jmax} - T_C)/R_{\theta JC}$.

* Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Semiconductor@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil/.

1.4 Primary electrical characteristics at T_C = +25°C.

Type	Min $V_{(BR)DSS}$ V_{GS} = 0 I_D = 1.0 mA dc	$V_{GS(TH)1}$ V_{DS} = V_{GS} I_D = 1.0 mA dc	Max I_{DSS1} V_{GS} = 0 V_{GS} = 80% of rated V_{DS}	Max $r_{DS(on)}$ (1) V_{GS} = 12V		$R_{\theta JC}$ Max	I_{AS}
				T_J = +25°C at I_{D2}	T_J = +125°C at I_{D2}		
	V dc	V dc Min Max	μA dc	Ω	Ω	°C/W	A (pk)
2N7512	100	2.0 4.5	25	0.054	0.090	2.2	54
2N7513	200			0.155	0.310		36
2N7514	250			0.230	0.449		11

(1) Pulsed (see 4.5.1).

2. APPLICABLE DOCUMENTS

* 2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

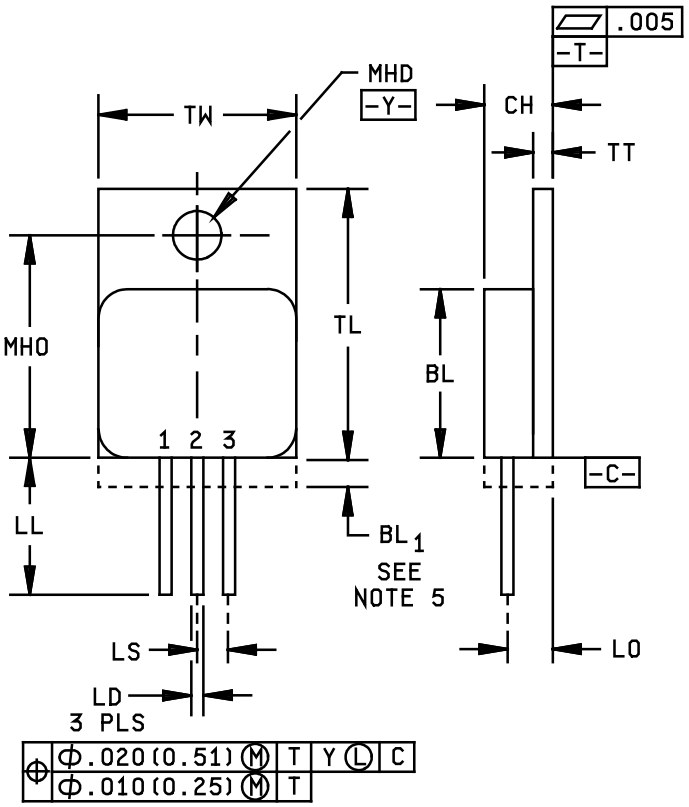
MIL-PRF-19500 - Semiconductor Devices, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-750 - Test Methods for Semiconductor Devices.

* (Copies of these documents are available online at http://quicksearch.dla.mil/.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.405	.425	10.27	10.80
CH	.190	.200	4.83	5.08
LD	.025	.035	0.64	0.89
LL	.600	.650	15.24	16.51
LO	.120 BSC		3.05 BSC	
LS	.100 TYP		2.54 TYP	
MHD	.140	.150	3.56	3.81
MHO	.522	.542	13.29	13.77
TL	.645	.665	16.38	16.89
TT	.035	.045	0.89	1.14
TW	.410	.420	10.41	10.67
Term 1	Gate			
Term 2	Drain			
Term 3	Source			

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. All terminals are isolated from case.
4. The preferred measurements used herein are the inch units. This transistor was designed using inch-pound units of measurement. In case of conflicts between the metric and inch-pound units, the inch-pound units shall be the rule.
5. This area is for the lead feed-thru eyelets (configuration is optional, but will not extend beyond this zone.
6. Die to base is BeO isolated, terminals to case ceramic (AL_2O_3) isolated.
7. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.
8. Dimension LD applies to base metal only.

FIGURE 1. Physical dimensions (similar to TO-257).

3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in MIL-PRF-19500 and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list before contract award (see 4.2 and 6.3).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500.

3.4 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, figure 1 (T3) and figure 2 (U3) herein. For 2N7625T3, methods used for electrical isolation of the terminals shall employ materials that contain a minimum of 90 percent Al_2O_3 (ceramic).

* 3.4.1 Lead finish. Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

* 3.4.2 Internal construction. Multiple chip construction shall not be permitted to meet the requirements of this specification.

3.5 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in 1.3, 1.4, and table I.

3.6 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table I herein.

* 3.7 Marking. Marking shall be in accordance with MIL-PRF-19500. At the option of the manufacturer, marking may be omitted from the body, but shall be retained on the initial container.

* 3.6 Electrostatic discharge protection. The devices covered by this specification require electrostatic discharge protection.

3.6.1 Handling. MOS devices must be handled with certain precautions to avoid damage due to the accumulation of static charge. The following handling practices shall be followed:

a. Devices shall be handled on benches with conductive handling devices.

b. Ground test equipment, tools, and personnel handling devices.

c. Do not handle devices by the leads.

d. Store devices in conductive foam or carriers.

e. Avoid use of plastic, rubber, or silk in MOS areas.

f. Maintain relative humidity above 50 percent if practical.

g. Care shall be exercised, during test and troubleshooting, to apply not more than maximum rated voltage to any lead.

h. Gate must be terminated to source, $R \leq 100\ k\Omega$, whenever bias voltage is to be applied drain to source.

3.9 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Classification of Inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.2).

b. Screening (see 4.3).

c. Conformance inspection (see 4.4 and tables I and II).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500. Alternate flow is allowed for qualification inspection in accordance with figure 4 of MIL-PRF-19500.

4.2.1 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E–IX of MIL-PRF-19500, and table III herein. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein.

* 4.3 Screening. Screening shall be in accordance with table E–IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

Screen (see table E–IV of MIL-PRF-19500)	Measurement	
	JANS	JANTXV
(1)	Method 3470 E_{AS} test (see 4.5.4)	Method 3470 E_{AS} test (see 4.5.4)
(1)	Method 3161 (see 4.5.3)	Method 3161 (see 4.5.3)
(1)	Gate stress test (see 4.5.5)	Gate stress test (see 4.5.5)
(2)	Subgroup 2 of table I herein	Subgroup 2 of table I herein
9	I_{GSS}, I_{DSS1} as a minimum	I_{GSS}, I_{DSS1} as a minimum
10	Method 1042 of MIL-STD-750, test condition B	Method 1042 of MIL-STD-750, test condition B
11	I_{GSSF1}, I_{GSSR1}, I_{DSS1}, $r_{DS(ON)}$, $V_{GS(TH)}$ Subgroup 2 of table I herein. ΔI_{GSSF1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{GSSR1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{DSS1} = ±25 µA dc or ±100 percent of initial value, whichever is greater.	I_{GSSF1}, I_{GSSR1}, I_{DSS1}, $r_{DS(ON)}$, $V_{GS(TH)}$ subgroup 2 of table I herein.
12	Method 1042 of MIL-STD-750, test condition A, 240 hours minimum.	Method 1042 of MIL-STD-750, test condition A, 160 hours minimum.
13	Subgroups 2 and 3 of table I herein ΔI_{GSSF1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{GSSR1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{DSS1} = ±25µA dc or ±100 percent of initial value, whichever is greater. $\Delta r_{DS(ON)1}$ = ±20 percent of initial value. $\Delta V_{GS(TH)1}$ = ±20 percent of initial value.	Subgroup 2 table I herein ΔI_{GSSF1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{GSSR1} = ±20 nA dc or ±100 percent of initial value, whichever is greater. ΔI_{DSS1} = ±25µA dc or ±100 percent of initial value, whichever is greater. $\Delta r_{DS(ON)1}$ = ±20 percent of initial value. $\Delta V_{GS(TH)1}$ = ±20 percent of initial value.
17	For TO–257 packages: Method 1081 of MIL-STD-750 (see 4.3.1), Endpoints: Subgroup 2 of table I herein	For TO–257 packages: Method 1081 of MIL-STD-750 (see 4.3.1), Endpoints: Subgroup 2 of table I herein

(1) Shall be performed anytime before screen 10.
(2) Shall be performed after E_{AS} test, method 3161, and gate stress test.

* 4.3.1 Dielectric withstanding voltage.

a. Magnitude of test voltage……800 V dc.

b. Duration of application of test voltage……..15 seconds (min).

c. Points of application of test voltage……..All leads to case (bunch connection).

d. Method of connection……..Mechanical.

e. Kilovolt-ampere rating of high voltage source…….1,200 V/1.0 mA (min).

f. Maximum leakage current……...1.0 mA.

g. Voltage ramp up time.....500 V/second

4.4 Conformance inspection. Conformance inspection shall be in accordance with MIL-PRF-19500. Alternate flow is allowed for quality conformance inspection in accordance with figure 4 of MIL-PRF-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with table E–V of MIL-PRF-19500 and table I herein.

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in tables E–VIa (JANS) and E–VIb (JAN, JANTX, and JANTXV) of MIL-PRF-19500 and 4.4.2.1 and 4.4.2.2 herein. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein. Delta V_{SD} measurements shall be in accordance with table IV herein.

* 4.4.2.1 Group B inspection, table E–VIa (JANS) of MIL-PRF-19500.

Subgroup	Method	Condition
B3	1051	Test condition F or G, 100 cycles.
B4	1042	Intermittent operation life, condition D. No heat sink or forced-air cooling on the device shall be permitted during the on cycle. T_{on} = 30 seconds minimum.
B5	1042	Accelerated steady-state reverse bias, condition A.
B5	1042	Accelerated steady-state gate bias, condition B.
B6	3161	Thermal resistance, see 4.5.2.

* 4.4.2.2 Group B inspection, table E–VIb (JANTXV) of MIL-PRF-19500.

Subgroup	Method	Condition
B3	1042	Intermittent operation life, condition D. No heat sink or forced-air cooling on the device shall be permitted during the on cycle. T_{on} = 30 seconds minimum.
B5	3161	Thermal resistance, see 4.5.2.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E–VII of MIL-PRF-19500 and as follows. Electrical measurements (end-points) shall be in accordance with table I, group A, subgroup 2 herein. Delta V_{SD} measurements shall be in accordance with table IV herein.

Subgroup	Method	Condition
C2	2036	Terminal strength, test condition A, weight = 10 pounds (4.54 Kg), t = 15 seconds.
C6	1042	Intermittent operation life, condition D. No heat sink or forced-air cooling on the device shall be permitted during the on cycle. T_{on} = 30 seconds minimum.

4.4.4 Group D inspection. Group D inspection shall be conducted in accordance with table E–VIII of MIL-PRF-19500 and table II herein.

* 4.4.5 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E–IX of MIL-PRF-19500 and as specified in table III herein. Electrical measurements (end-points) shall be in accordance with table I, subgroup 2 herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with method 3161 of MIL-STD-750. The maximum limit of $R_{\theta JC}$ = 2.2°C/W. The following parameters shall apply:

a. Measuring current(I_M)..... 10 mA.

b. Drain heating current (I_H)..... 1 A.

c. Heating time (t_H)..... Steady-state (see method 3161 of MIL-STD-750).

d. Drain-source heating voltage (V_H)..... 25 V.

e. Measurement time delay (t_{MD})..... 30 to 60 μs.

f. Sample window time (t_{SW})..... 10 μs maximum.

4.5.3 Thermal response (V_{SD} measurement). The delta V_{SD} measurement shall be performed in accordance with method 3161 of MIL-STD-750. The delta V_{SD} conditions (I_H and V_H) and maximum limit shall be derived by each vendor from the thermal response curves (see figure 2) and shall be specified in the certificate of conformance prior to qualification. The following parameter measurements shall apply:

a. Measuring current (I_M).....10 mA.

b. Drain heating current (I_H).....1 A.

c. Heating time (t_H).....100 ms.

d. Drain-source heating voltage (V_H).....25 V.

e. Measurement time delay (t_{MD}).....30 - 60 μs.

f. Sample window time (t_{SW}).....10 μs maximum.

4.5.4 Single pulse avalanche energy (E_{AS}).

a. I_{AS} shall be as specified in 1.4 herein.

b. L = 0.1 mH.

c. Gate to source resistor (25 Ω ≤ R_{GS} ≤ 200Ω).

d. $E_{AS} = 1/2\ LI_{AS}^{2.}$.

e. V_{DD} = 50 V to 150 V dc.

f. Initial junction temperature = +25°C, -5°C, +10°C.

4.5.5 Gate stress test.

a. V_{GS} = 45 V.

b. t = 250 μs, minimum.

TABLE I. Group A inspection

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Breakdown voltage drain to source	3407	V_{GS} = 0V, I_D = 1 mA dc, bias condition C	$V_{(BR)DSS}$			
2N7512				100		V dc
2N7513				200		V dc
2N7514				250		V dc
Gate to source voltage (threshold)	3403	V_{DS} = V_{GS}, I_D = 1 mA dc	$V_{GS(TH)1}$	2.0	4.5	V dc
Gate current	3411	V_{GS} = ±30 V dc, bias condition C, V_{DS} = 0V	I_{GSS1}		±100	nA dc
Drain current	3413	V_{GS} = 0V dc, bias condition C, V_{DS} = 80 percent of rated V_{DS}	I_{DSS1}		25	µA dc
Static drain to source "ON" state resistance	3421	V_{GS} = 12V dc, condition A, pulsed (see 4.5.1), I_D = I_{D2}	$r_{DS(ON)1}$			
2N7512					0.054	Ω
2N7513					0.155	Ω
2N7514					0.230	Ω
Static drain to source "ON" state resistance	3405	V_{GS} = 12V dc, condition A, pulsed (see 4.5.1), I_D = I_{D1}	$V_{DS(ON)}$			
2N7512					0.880	V dc
2N7513					2.31	V dc
2N7514					2.64	V dc
Forward voltage	4011	V_{GS} = 0V dc, condition A, pulsed (see 4.5.1), I_D = I_{D1}	V_{SD}		1.2	V dc
Subgroup 3						
High temperature operation		T_C = T_J = +125°C				
Gate current	3411	V_{GS} = ±30V dc, bias condition C, V_{DS} = 0 V	I_{GSS2}		±200	nA dc
Drain current	3413	V_{GS} = 0V dc, bias condition C, V_{DS} = 80 percent of rated V_{DS}	I_{DSS2}		0.250	mA dc
Static drain to source "ON" state resistance	3421	V_{GS} = 12V dc, condition A, pulsed (see 4.5.1), I_D = I_{D1}	$r_{DS(ON)2}$			
2N7512					0.090	Ω
2N7513					0.310	Ω
2N7514					0.449	Ω

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
Subgroup 3 - continued						
Gate to source voltage (threshold)	3403	$V_{DS} = V_{GS}$, I_D = 1 mA dc	$V_{GS(TH)2}$	1.0		V dc
Low temperature operation		$T_C = T_J$ = -55°C				
Gate to source voltage (threshold)	3403	$V_{DS} = V_{GS}$, I_D = 1 mA dc	$V_{GS(TH)3}$		5.5	V dc
Subgroup 4						
Switching time test	3472	$I_D = I_{D1}$, V_{GS} = 12 V dc, R_G = 7.5 Ω, V_{DD} = 50 percent of rated V_{DS}				
Turn-on delay time			$t_{D(on)}$			
2N7512					20	ns
2N7513					20	ns
2N7514					20	ns
Rise Time			t_R			
2N7512					40	ns
2N7513					40	ns
2N7514					40	ns
Turn-off delay time			$t_{D(off)}$			
2N7512					35	ns
2N7513					35	ns
2N7514					35	ns
Fall time			t_f			
2N7512					15	ns
2N7513					15	ns
2N7514					30	ns
Subgroup 5						
Safe operating area test (high voltage)	3474	See figure 3, t_p = 10 ms min. V_{DS} = 80 percent of max. rated V_{DS} ($V_{DS} \leq$ 200 V)				
Electrical measurements		See table I, group A, subgroup 2 herein.				
Subgroup 6						
Not applicable						

See footnotes at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Condition		Min	Max	
Subgroup 7						
Gate charge	3471	Condition A or B				
On-state gate charge			$Q_{G(ON)}$			
2N7512					35	nC
2N7513					28	nC
2N7514					28	nC
Gate to source charge			Q_{GS}			
2N7512					13	nC
2N7513					12	nC
2N7514					12	nC
Gate to drain charge			Q_{GD}			
2N7512					12	nC
2N7513					10	nC
2N7514					10	nC
Reverse recovery time	3473	di/dt = 100 A/µs, $V_{DD} \leq 50$ V, $I_D = I_{D1}$	t_{rr}			
2N7512					180	ns
2N7513					220	ns
2N7514					410	ns

1/ For sampling plan, see MIL-PRF-19500.

TABLE II. Group D inspection.

Inspection 1/ 2/ 3/ 4/ 5/	MIL-STD-750		Symbol	Pre-irradiation limits		Post irradiation limits		Units
	Method	Conditions		Min.	Max.	Min.	Max.	
Subgroup 1								
Not applicable								
Subgroup 2		T_C = +25°C						
Steady state total dose irradiation (V_{GS} bias)	1019	V_{GS} = 12V, V_{DS} = 0V						
Steady state total dose irradiation (V_{DS} bias)	1019	V_{GS} = 0V, V_{DS} = 80 percent of rated V_{DS}						
Breakdown voltage drain to source	3407	V_{GS} = 0V, I_D = 1 mA dc, bias condition C	$V_{(BR)DSS}$					
2N7512				100		100		V dc
2N7513				200		200		V dc
2N7514				250		250		V dc
Gate to source voltage (threshold)	3403	V_{DS} = V_{GS}, I_D = 1 mA dc	$V_{GS(TH)1}$	2.0	4.5	2.0	4.5	V dc
Gate current	3411	V_{GS} = ± 30V dc, V_{DS} = 0V, bias condition C	I_{GSS1}		±100		±100	nA dc
Drain current	3413	V_{GS} = 0V, V_{DS} = 80 percent of rated V_{DS}, bias condition C	I_{DSS1}		25		25	µA dc
Static drain to source "ON"-state resistance	3421	V_{GS} = 12V dc, condition A, pulsed (see 4.5.1), I_D = I_{D2}	$r_{DS(ON)1}$					
2N7512					0.054		0.054	Ω
2N7513					1.155		1.155	Ω
2N7514					0.230		0.230	Ω
Static drain to source "ON"-state voltage	3405	V_{GS} = 12V dc, condition A, pulsed (see 4.5.1), I_D = I_{D1}	$V_{DS(ON)}$					
2N7512					0.88		0.88	V dc
2N7513					2.31		2.31	V dc
2N7514					2.64		2.64	V dc

1/ For sampling plan see MIL-PRF-19500.
2/ Electrical specifications are for 'D' and 'R' rad levels.
3/ Group D qualification may be performed prior to lot formation. Wafers qualified to these group D QCI requirements may be used for any other detail specification utilizing the same die design.
4/ Separate samples shall be pulled for each bias.
5/ At the manufacturer's option, group D samples need not be subjected to all the screening tests, but shall be assembled in its qualified package or in any qualified package that the manufacturer has data to correlate the performance to the designated package.

* TABLE III. Group E inspection (all quality levels) - for qualification only.

Inspection 1/	MIL-STD-750		Qualification and large lot conformance inspection
	Method	Conditions	
Subgroup 1			45 devices c = 0
Temperature cycling (air to air)	1051	Test condition F or G, 500 cycles	
Hermetic seal	1071		
Fine leak Gross leak			
Electrical measurements		See table I, group A, subgroup 2 herein.	
Subgroup 2 2/			45 devices c = 0
Steady-state gate bias	1042	Test condition B; 1,000 hours	
Electrical measurements		See table I, group A, subgroup 2 herein.	
Steady-state reverse bias	1042	Test condition A; 1,000 hours	
Electrical measurements		See table I, group A, subgroup 2 herein.	
Subgroup 3			
Not applicable			
Subgroup 4			Sample Size N/A
Thermal impedance curves		See MIL-PRF-19500	
Subgroup 5			15 devices c = 0
Barometric pressure test (not required for $V_{BR(DSS)} \leq 200$ V) 2N7514	1001	Test condition C V_{DS} = 250 V; $I_{(ISO)}$ < 0.25 mA	

1/ A separate sample for each test may be pulled.
2/ As a minimum, gate to source leakages and drain to source leakage are to be examined to verify the electrical performance of the DUT prior to and after test. At the manufacturer's option, the remaining tests in table I, group A, subgroup 2 may be performed.
3/ This sampling plan applies to each bias condition specified.

TABLE IV. Group B, C and E delta measurements

Step	Inspection 1/ 2/	MIL-STD-750		Symbol	Limits		Units
		Method	Conditions		Min	Max	
1.	Thermal response	3161	See 4.5.3	ΔV_{SD}		125	mV

1/ The delta measurements for group B, table E–VIa (JANS) of MIL-PRF-19500 shall be step 1 above and shall be in subgroup 4.
2/ The delta measurements for group C, table E–VII of MIL-PRF-19500 shall be step 1 above and shall be in subgroup 6.

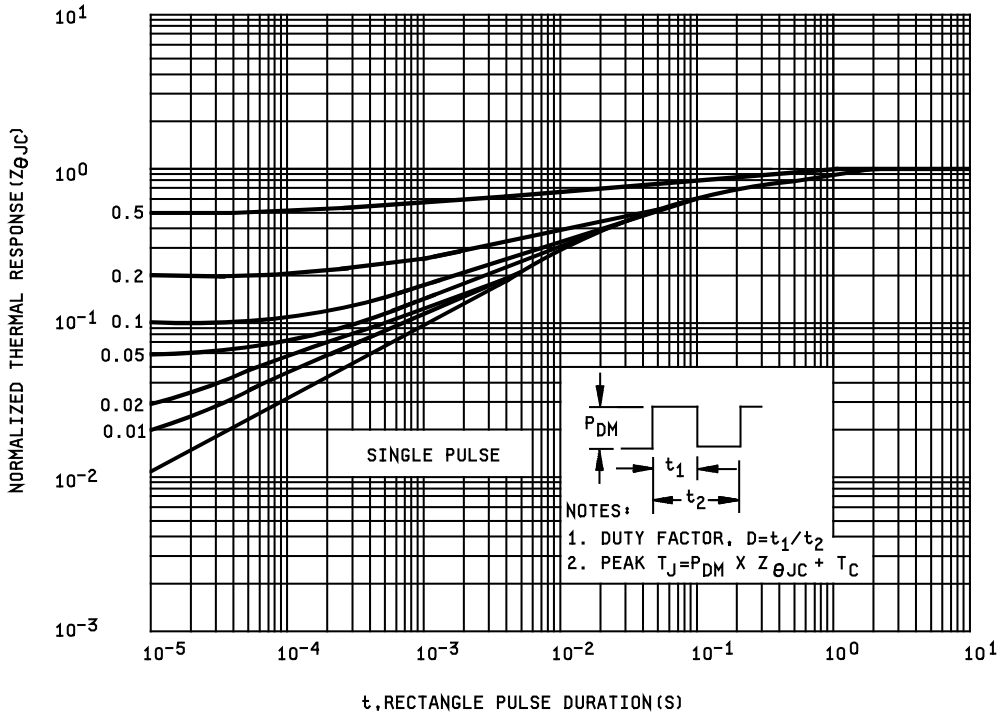


FIGURE 2. Thermal response curves.

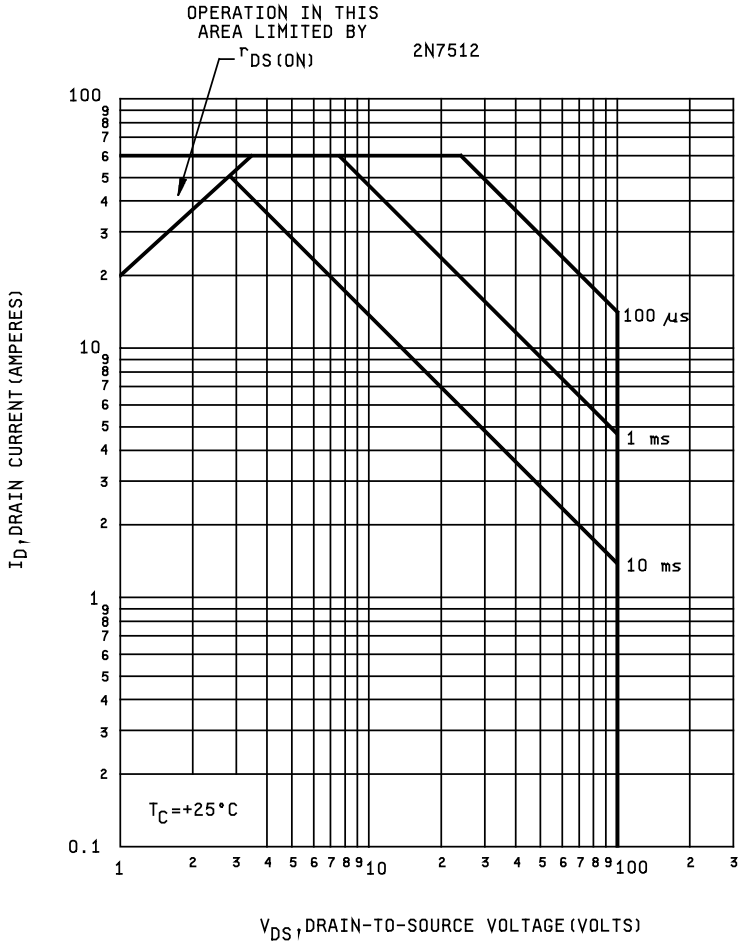


FIGURE 3. Safe operating area graphs.

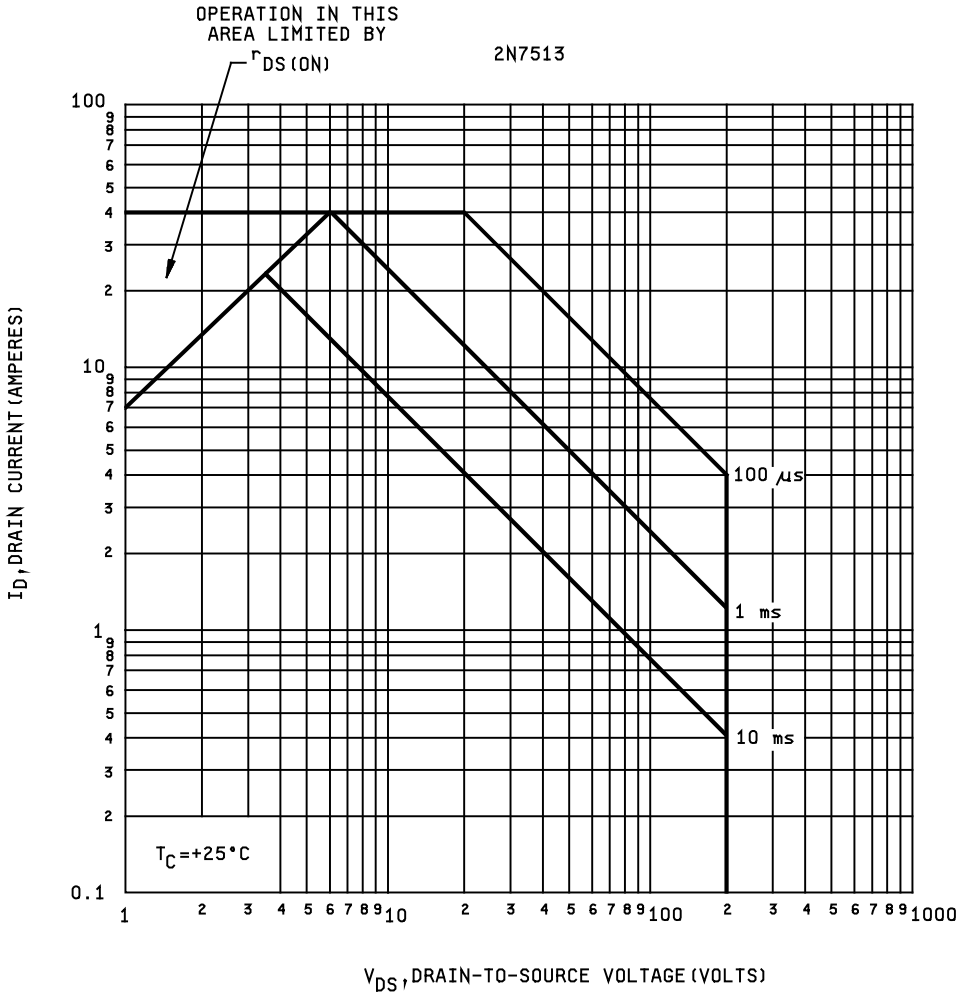


FIGURE 3. Safe operating area graphs - Continued.

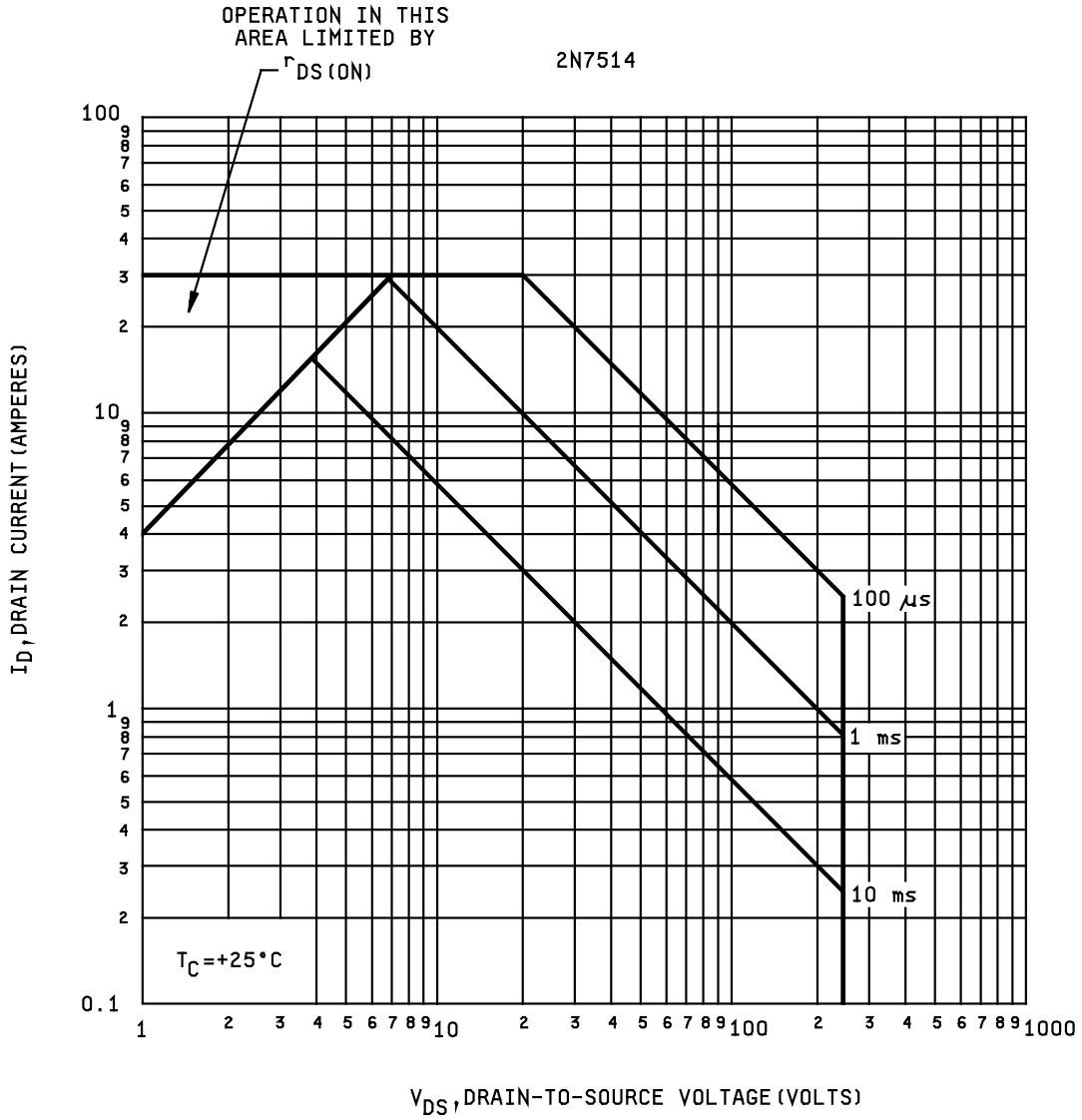


FIGURE 3. Safe operating area graphs - Continued.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

* 6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Packaging requirements (see 5.1).

c. Lead finish (see 3.4.1).

d. The complete Part or Identifying Number (PIN), see scope and section 1.

e. For acquisition of RHA designated devices, table II, subgroup 1 testing of group D herein is optional. If subgroup 1 is desired, it should be specified in the contract.

f. If specific SEE characterization conditions are desired (see section 6.5 and table IV), manufacturer's cage code should be specified in the contract or order.

g. If SEE testing data is desired, it should be specified in the contract or order.

* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail vqe.chief@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.dla.mil.

6.4 Cross-reference list. The following table shows the generic P/N and its associated military P/N (without JAN and RHA prefix).

Generic P/N	Military P/N
FSGS130	2N7512
FSGS230	2N7513
FSGS234	2N7514

* 6.5 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

Custodians:
Army – CR
Navy - EC
Air Force - 85
NASA – NA
DLA – CC

Review activities:
Air Force - 99

Preparing activity:
DLA - CC

(Project 5961-2014-074)

* NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil/.